



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/781,597	02/18/2004	Horii Hideki	5649-1227	2665

7590 01/26/2006

Timothy J. O'Sullivan, Esq.  
Myers, Bigel Sibley & Sajovec, P.A.  
P.O. Box 37428  
Raleigh, NC 27627

EXAMINER

SOWARD, IDA M

ART UNIT	PAPER NUMBER
2822	

DATE MAILED: 01/26/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

10/781,597

**Applicant(s)**

HIDEKI ET AL.

**Examiner**

Ida M. Soward

**Art Unit**

2822

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 09 November 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-27, 51 and 52 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 12-27 is/are allowed.
- 6) ☒ Claim(s) 1 and 5-9 is/are rejected.
- 7) ☒ Claim(s) 2-4, 10-11 and 51-52 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

This Office Action is in response to the Applicants' amendment filed November 9, 2005.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 and 5-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Xu (US 6,437,383 B1) in view of Oishi et al. (JP10340489A).

In regard to claim 1, Xu teaches a phase-changeable memory device, comprising: a phase-changeable material pattern 290 of a phase-changeable material; and first and second electrodes 230 electrically connected to the phase-changeable material pattern 290 and provide an electrical signal thereto (Figure 18, columns 8 and 10, lines 55-63 and 17-64, respectively).

In regard to claim 5, Xu teaches the first and second electrodes 230 comprising a conductive material containing nitrogen, a conductive material containing carbon, titanium, tungsten, molybdenum, tantalum, titanium silicide, tantalum silicide and/or a combination thereof (column 9, lines 3-15).

Art Unit: 2822

In regard to claim 6, Xu teaches the first and/or second conductive electrodes further include one of a metal nitride, a refractory metal nitride, a metal silicon nitride, a refractory metal silicon nitride, a metal silicide, and a refractory metal silicide (column 9, lines 3-15).

In regard to claim 7, Xu teaches the conductive material containing nitrogen comprising a metal nitride (column 9, lines 3-15).

In regard to claims 8, Xu teaches a transistor including a source region 200, a drain region 200 and a gate electrode 160; a lower interconnection 132 electrically connected to the drain region 200; and an upper metal interconnection electrically connected to one of the first and second electrodes; wherein the other of the first and second electrodes 230 is electrically connected to the source region 200 (Figure 18, column 7, lines 1-67).

In regard to claim 9, Xu teaches a phase-changeable memory device, comprising: a phase-changeable material pattern 290 of a phase-changeable material having a polycrystalline structure; and first and second electrodes 230 electrically connected to the phase-changeable material pattern 290 to provide an electrical signal thereto (Figure 18, columns 8 and 10, lines 55-63 and 17-64, respectively).

However, Xu fails to teach phase-changeable material that includes nitrogen atoms.

Oishi et al. teach phase-changeable material that includes nitrogen atoms (title and abstract).

Art Unit: 2822

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the phase-changeable memory device as taught by Xu with the phase-changeable device having phase-changeable material that includes nitrogen atoms as taught by Oishi et al. to avoid the necessity of highly pure gas (advantage).

### ***Allowable Subject Matter***

Claims 12-27 are allowed.

Claims 2-4, 10-11 and 51-52 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

### ***Response to Arguments***

Applicant's arguments with respect to claims 1-27 and 51-52 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The following patents are cited to further show the state of the art with respect to phase-changeable material:

Craig (US 6,381,967 B1)

Gallagher et al. (5,811,816)

Thielen et al. (US 6,258,062 B1).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ida M. Soward whose telephone number is 571-272-1845. The examiner can normally be reached on Monday - Thursday 6:30am to 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Zandra V. Smith can be reached on 571-272-2429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

IMS  
January 22, 2006

*Ida M. Soward*  
*ALU 2822*